HPC for All: Building Bridges to Untapped Computational Power

Lead Supervisor: Dr Manhui Wang
Department: Research IT, IT Services, University of Liverpool
Email: Manhui.Wang@liverpool.ac.uk

Project Context and Overarching Goals

Barkla2, the University of Liverpool's latest HPC cluster, represents a major upgrade in computational infrastructure, featuring state of the art enterprise level GPUs and a substantial expansion in overall compute capacity. Despite all UoL members being equally entitled to access this resource, usage remains heavily concentrated among traditionally compute intensive disciplines such as Computer Science, Physics, Engineering, and Chemistry. A wide range of departments where computational research is becoming increasingly relevant and valuable have little or no meaningful engagement with HPC, often due to a lack of awareness, prior experience, or confidence in navigating what can appear to be an intimidating technical landscape.

The overarching goal of this project is to break down these barriers and inspire genuine, sustainable adoption of HPC across new research areas within the university. The intern will proactively engage with underrepresented research groups, establishing dialogue to understand their current workflows and identify where HPC could provide meaningful acceleration or capability gains. Following this scoping work, bespoke workshops will be designed and delivered for each group, accompanied by tailored presentations, practical training exercises, and accessible technical documentation. By meeting researchers where they are, using familiar software environments and relevant worked examples, the project aims to make HPC feel approachable and immediately useful, rather than an abstract or specialist resource.

The initiative builds on an existing foundation of introductory HPC talks, online user documentation, and SLURM job examples developed by the Research IT team. Workshops have already been delivered to groups from the Institute of Population Health, the Department of Geography and Planning, and the Department of Pharmacology and Therapeutics, with further sessions ongoing. A presentation summarising the initiative, outcomes, and recommendations for future engagement will be delivered at the N8 Internship Conference.

Computational Aspects and the Role of HPC

This project is centred on the Barkla HPC platform, and the intern will develop strong working familiarity with the system, including the SLURM workload manager, available software modules, and job submission workflows, in order to credibly demonstrate its capabilities to diverse research audiences. Computational work across the target groups is expected to be primarily CPU based, though GPU usage will be explored and demonstrated where it is appropriate to a group's specific research needs.

For each engaged group, tailored practical examples are developed to illustrate in concrete terms how HPC can accelerate their specific workflows, whether applied to statistical modelling, large scale data processing, simulation, or other computationally intensive tasks. This field specific approach ensures that researchers can see an immediate and tangible benefit to adopting HPC, lowering the barrier to entry and encouraging sustained engagement with the platform.

HPC resources are key to this project's success not only as the subject of training, but as the mechanism through which new research groups can unlock step changes in the scale and speed of their work. By connecting researchers to Barkla through targeted, field specific engagement, the project will expand the productive use of a significant university wide computational investment, ensuring its benefits are felt broadly across the institution rather than remaining concentrated in a small number of established user communities.